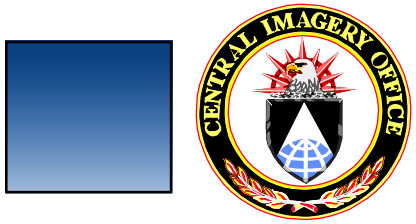


Central Imagery Office

Common Imagery Interoperability Facilities (CIIF)

Agenda

- Motivation for CIIFs
- Technical Overview of Facilities
- Common Imagery Interoperability Working Group
- Management Process
- Progress to Date
- Current Activities
- Points of Contact
- Acronyms

Motivation for CIIFs

- **Distributed Object Technologies are the acknowledged software technology of the future**
  - Objects are modular, portable, interoperable software components
  - Applications consist of and use standard components
  - Objects are changing the way software is developed, assembled, sold, and distributed
  - Objects *interoperate* across multiple operating systems, networks, languages, applications, and hardware platforms
  - Software development is faster, cheaper, and more reliable

Common Imagery Interoperability Facilities Project Goals

- Identify and define Application Program Interfaces (APIs) specific to Imagery Community
- Use of standard APIs will:
  - Enhance interoperability & portability of software applications
  - Facilitate sharing of imagery data & services
  - Facilitate insertion of low-cost commercial technology

Common Imagery Interoperability Facilities Description

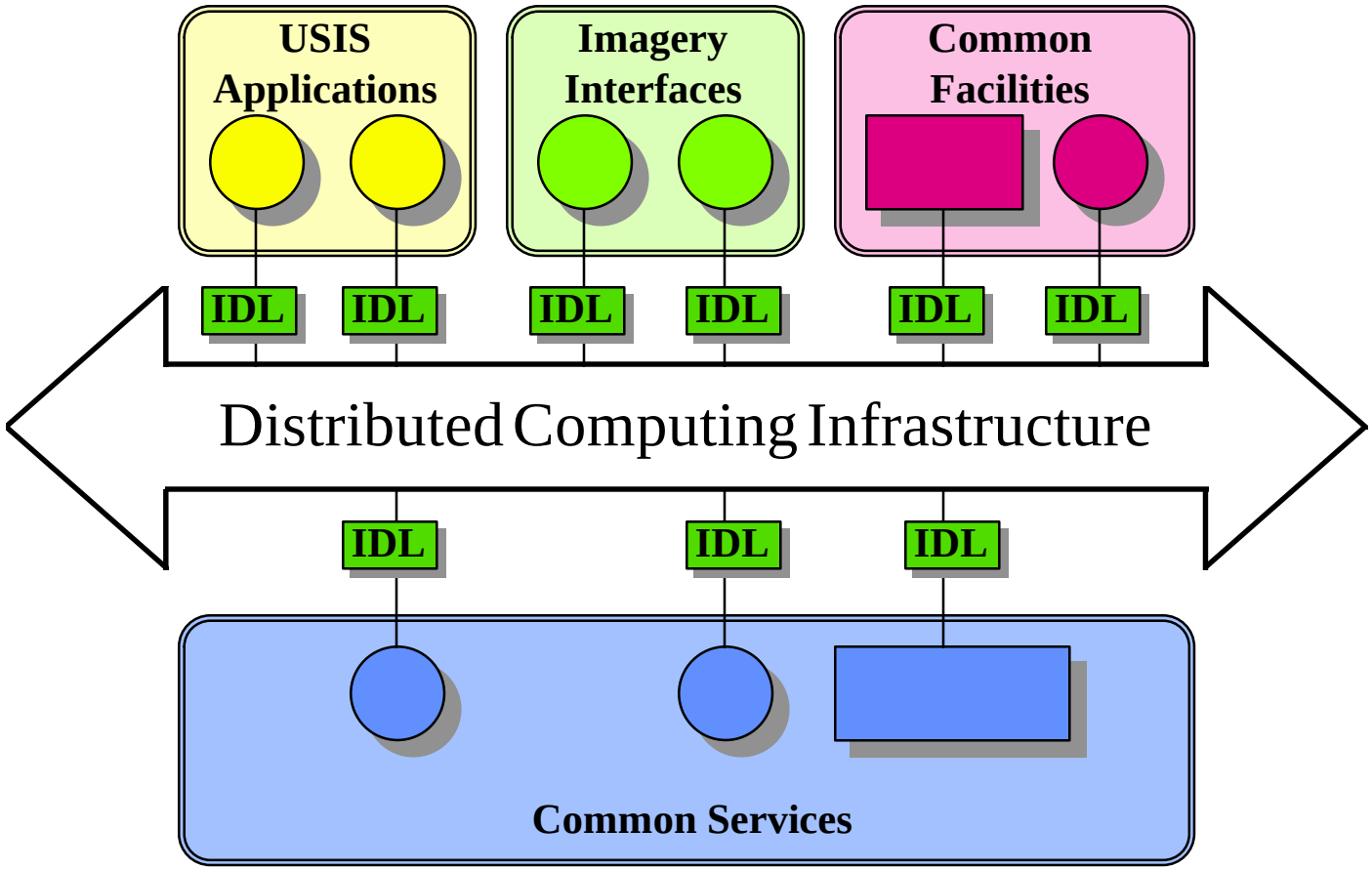
- **Facility: A specification that describes a collection of closely-related software interfaces**
  - Imagery-specific services
  - Defines interactions among software components as a set of Application Program Interfaces (APIs)
  - Written in OMG's Interface Definition Language (IDL)

- **Required services derived from *USIS Technical Architecture Requirements* & *A³I Requirements Document***

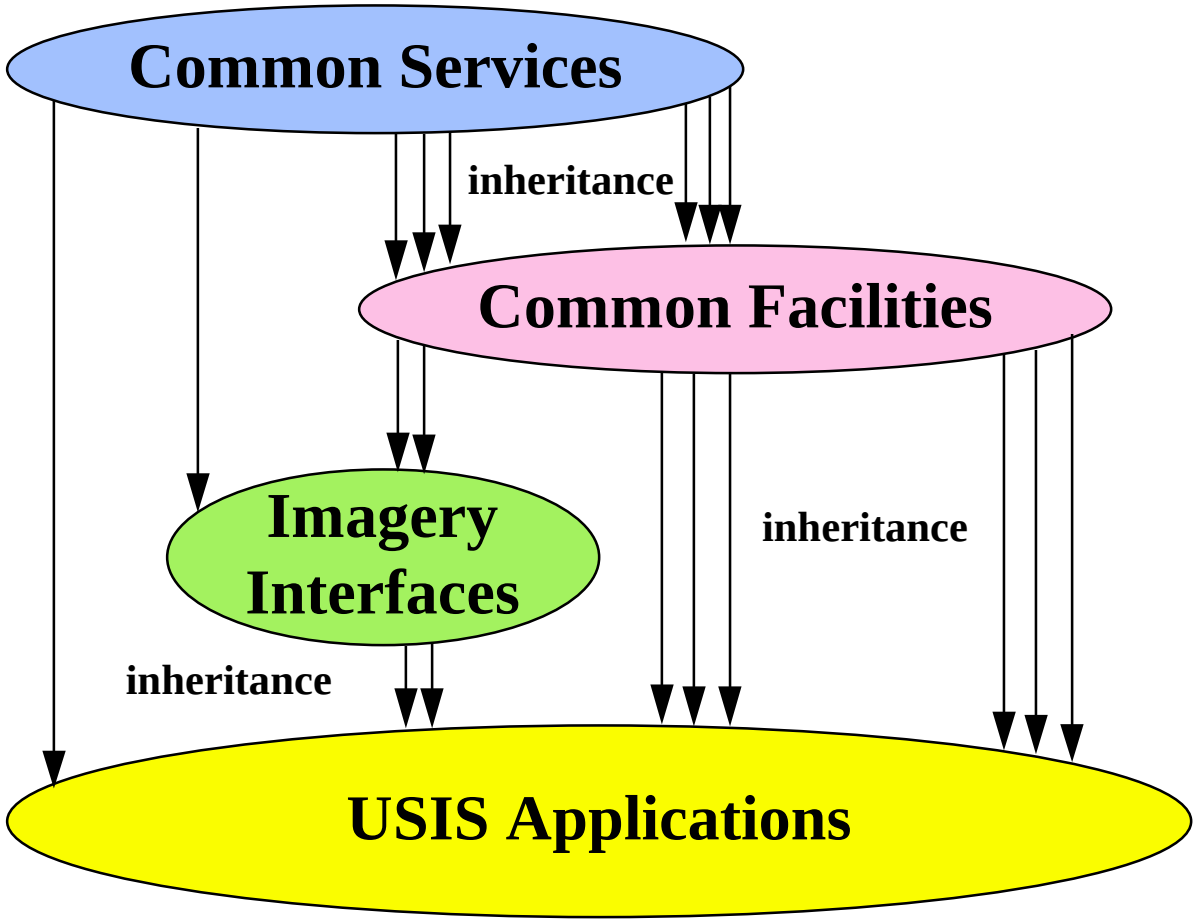
Common Imagery Interoperability Facilities Architectural Goals

- Maximize Facility independence and modularity
- Minimize duplication of functionality between Facilities
- Identify & eliminate hidden interfaces
- Maximize consistency among Facilities
- Promote extensibility of individual Facilities
- Facilitate addition of new Facilities
- Provide precise Facility descriptions
- Ensure integrity, reliability, safety of Facilities
- Consider performance issues
- Promote scalability, portability, interoperability

CIIF Reference Model



Reuse of Common Services, Facilities & Imagery Interfaces



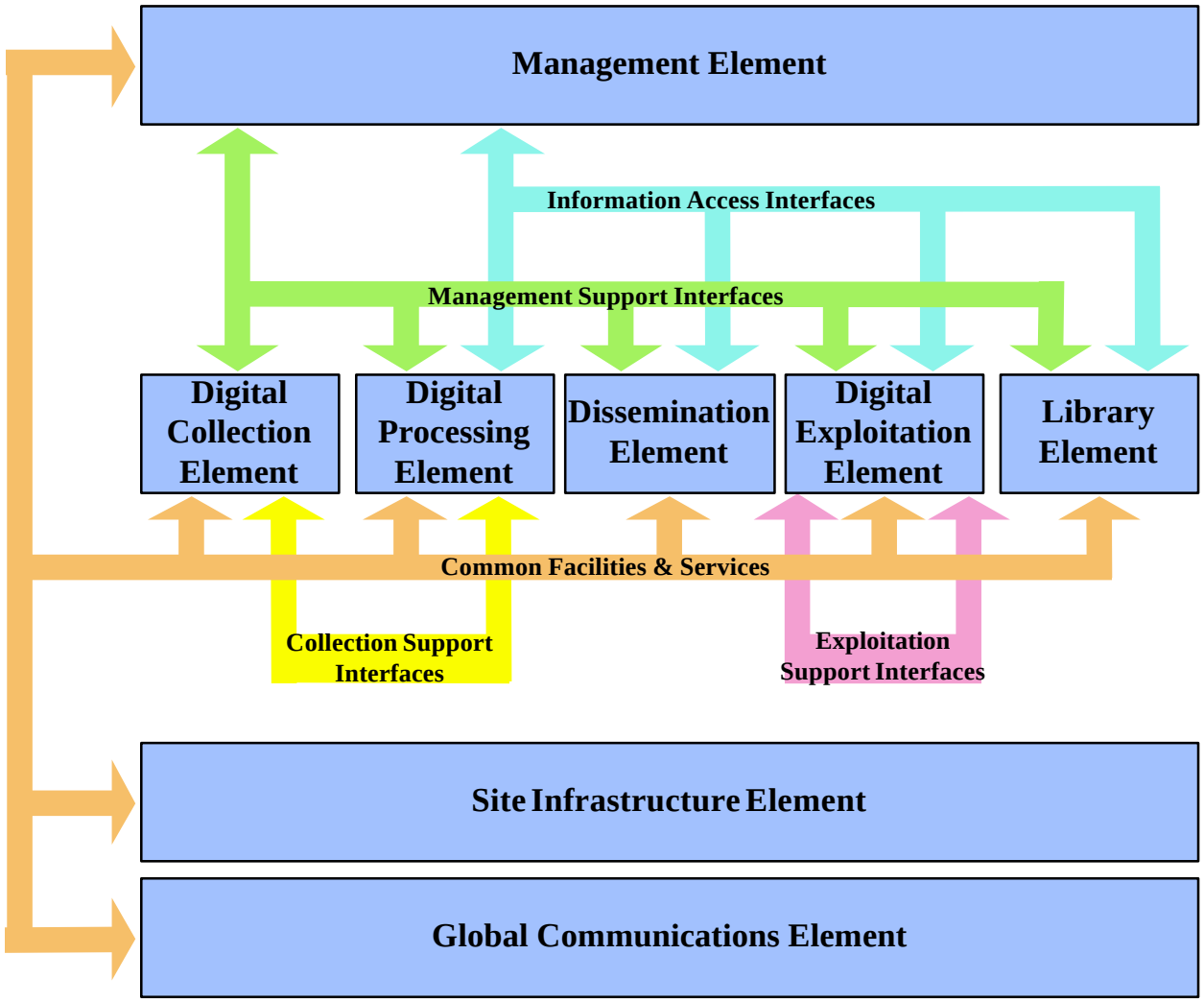
Globally-Applicable Fundamental Services

Higher-Level Facilities & Specifications of Object Services

Specialized Imagery Interfaces

USIS Application Software that Makes Extensive Use of CIIF Standards

Major Categories of CIIF Interfaces



USIS Digital Elements

- **Management -** Integrates operations of the USIS enterprise
- **Digital Collection -** Source of USIS imagery
- **Digital Processing -** Provider of imagery in useful form
- **Dissemination -** Initiates delivery to specified users
- **Library -** Retrieval-based access to imagery information
- **Digital Exploitation -** Provider of imagery products
- **Site Infrastructure -** Supports USIS and all other activities at site
- **Global Communications -** Provides communications to USIS and other users

USIS Technical Architecture
Major Categories

- **Information Access**
  - Provides the means to store, catalog, discover, and retrieve imagery and imagery-derived products; define standing profiles of users' imagery-related intelligence interests; and support the automatic dissemination of current imagery and imagery-derived products to appropriate recipients
- **Exploitation Support**
  - Provides a collection of image manipulation and automated image analysis capabilities, in support of critical imagery exploitation functions
- **Management Support**
  - Provides improved (more-fully interoperable) capabilities to manage and distribute imagery collection requirements and the associated collection, processing, and exploitation tasking and status reporting; also provides improved capabilities to distribute collection system coverage forecasts, and to manage detailed exploitation tasking

USIS Technical Architecture
Major Categories (Continued)

- **Collection Support**
  - Provides standardized mechanisms to route raw (unprocessed) imagery (along with its associated processing support data) from digital collection systems to the appropriate (usually ground-based) processing systems; includes accommodations, as appropriate, for the stringent throughput requirements of certain high-capacity collection systems
- **Common Facilities & Services**
  - Identifies selected OMG-developed standards for multimedia and compound-document data exchange, for data encoding and compression/decompression support, for imagery display and printing support, and for system security; identifies potential commercial standards for collaborative processing, generic data base search and retrieval, archival (hierarchical) storage management, and automated negotiation of compatible interfaces (i.e., Service Trading).

Common Imagery Interoperability Facilities: Information Access Interfaces

- **Catalog Access Facility**
  - Supports local and global imagery product discovery, product attribute (metadata) retrieval, product browsing, and product cataloging and indexing
- **Image Access Facility**
  - Retrieve selected imagery products from an imagery library, update contents of an imagery library (by storing, deleting, or modifying imagery products)
- **Imagery Compression Facility**
  - Provides generalized services for imagery compression & decompression, conversion between internal representations & standardized representations of such data
- **Imagery Dissemination Facility**
  - Receives, prepares (i.e., reformat, compress, decompress, etc.), prioritizes, and transmits imagery products; manages product distribution
- **Profile & Notification Facility**
  - Registers and maintains standing interest profiles for imagery consumers; screens products against these profiles, and routes products or product availability notifications, as appropriate
- **Video Access**
  - Supports local and global video imagery product discovery, attribute retrieval, browsing, cataloging & indexing, retrieval, library updating

Common Imagery Interoperability Facilities: Exploitation Support Interfaces

- **Image Mensuration Facility**
  - Measures spatial characteristics of objects appearing within images
- **Image Processing Facility**
  - Manipulates imagery (resize, change color and constrast values, apply filters, manipulate image resolution, etc.), conducts mathematical analyses of image characterstics (compute histograms, convolutions, etc.)
- **Image Registration Facility**
  - Automatically aligns, co-registers, or determines image-to-image spatial correlations on the basis of image content
- **Geopositioning Facility**
  - Supports the derivation of precise geographic coordinates on images and maps
- **Automatic Target Recognition**
  - Automatically detects, categorizes, counts, determines relationships among objects appearing within images
- **Image Synthesis**
  - Creates, transforms images using computer-based spatial models, perspective transformations, manipulates image characteristics to improve visibility, sharpen resolution, reduce effects of cloud cover or haze
- **Image Understanding**
  - Automates image change detection, registers image differencing, significance-of-difference analysis & display, area-based & model-based differencing
- **Video Exploitation**
  - Provides access to automated tools for the video imagery exploitation

Common Imagery Interoperability Facilities: Management Support Interfaces

- **Imagery Collection Management**
  - Submits & obtains status of imagery nominations; passes resource and requirement information between Management Element and Collection, Processing, Exploitation Elements
- **Collection Forecast Reporting**
  - Passes collection planning data between Management, Collection, Processing, Exploitation Elements
- **Exploitation Task Management**
  - Conveys task packages, task assignment status data, resource availability information between various components of the Exploitation Element
- **Accomplishment Status Reporting**
  - Provides feedback, status, reporting information to the Management Element concerning workload accomplishment status within the Collection, Processing, Dissemination, Exploitation, & Library Elements
- **Operational Status Reporting**
  - Bears resource, organization, operational statistics/status data between components of the Management Element and Collection, Processing, Dissemination, Exploitation, & Library Elements

Common Imagery Interoperability Facilities: Collection Support Interfaces

- **Unprocessed Imagery Transfer**
  - Handles unique requirements for passing unprocessed imagery from the Digital Collection Element to the Digital Processing Element.

Common Facilities & Services

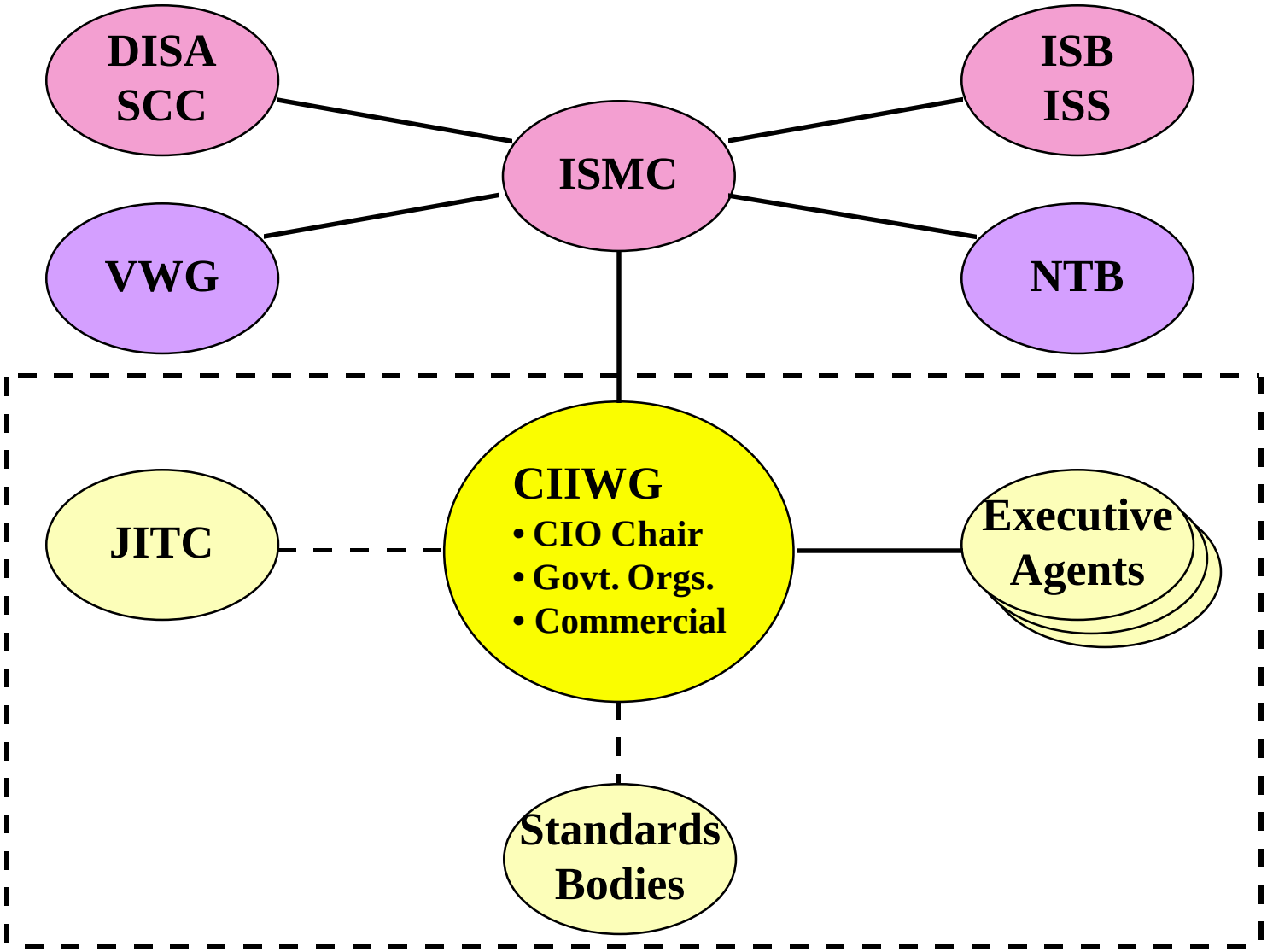
Common Facilities

- Automation & Scripting Facility
- Common Management Facility
- Compound Presentation & Interchange Facility
- Data Interchange Facility
- Information Storage & Retrieval Facility
- Internalization & Time Operations Facility
- Meta-Object Facility
- Mobile Agents Facility
- Printing Facility
- Rendering Management Facility
- Security Administration Facility
- Workflow Facility

Common Services

- Collections Service
- Concurrency Service
- Event Service
- Externalization Service
- Interface Versioning Service
- Licensing Service
- Life Cycle Service
- Messaging Service
- Naming Service
- Persistent Object Service
- Properties Service
- Query Service
- Relationship Service
- Security Service
- Startup Service
- Transaction Service

Common Imagery Interoperability Working Group Management Structure



CIIWG Membership

- Chair: Member of CIO, Designated by ISMC
- Members: Government, Commercial *Organizations*
  - Formal Registration to CIIWG Chair
  - Primary (Voting) Member + Alternates
  - Must actively participate prior to voting

Common Imagery Interoperability Facilities Working Group Objectives

- **Develop set of Facilities for use in USIS**
- **Develop *CIIF Reference Model* to establish an architectural framework**
- **Establish a management process to control Facility:**
  - Definition
  - Development
  - Test
  - Implementation
  - Standardization
  - Maintenance

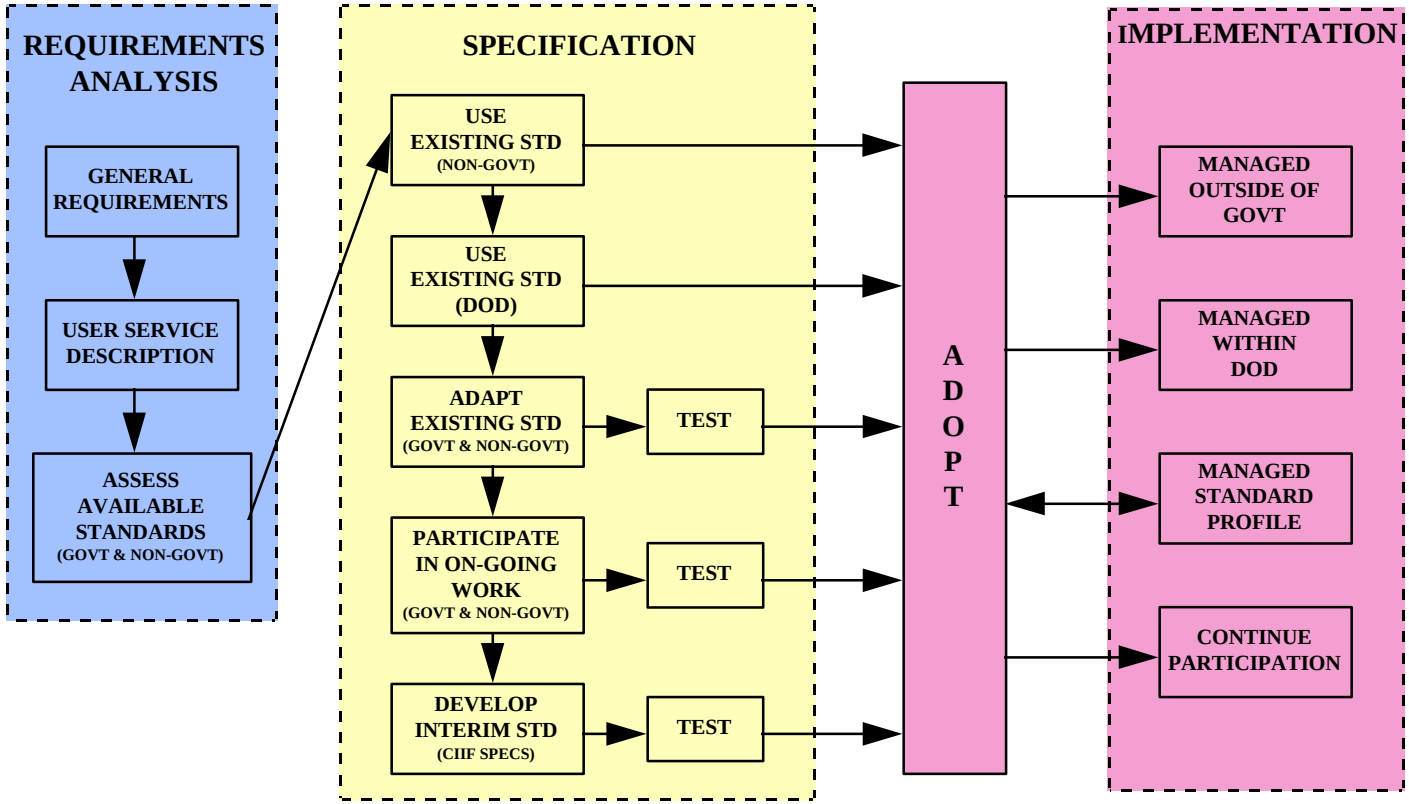
Common Imagery Interoperability Facilities Working Group Objectives (Continued)

- **Promulgate Facilities via *USIS Standards & Guidelines***
- **Submit Facilities for adoption as commercial or government standards**
- **Facilitate involvement of commercial vendors in API development**
  - Simplify standards-compliant commercial production

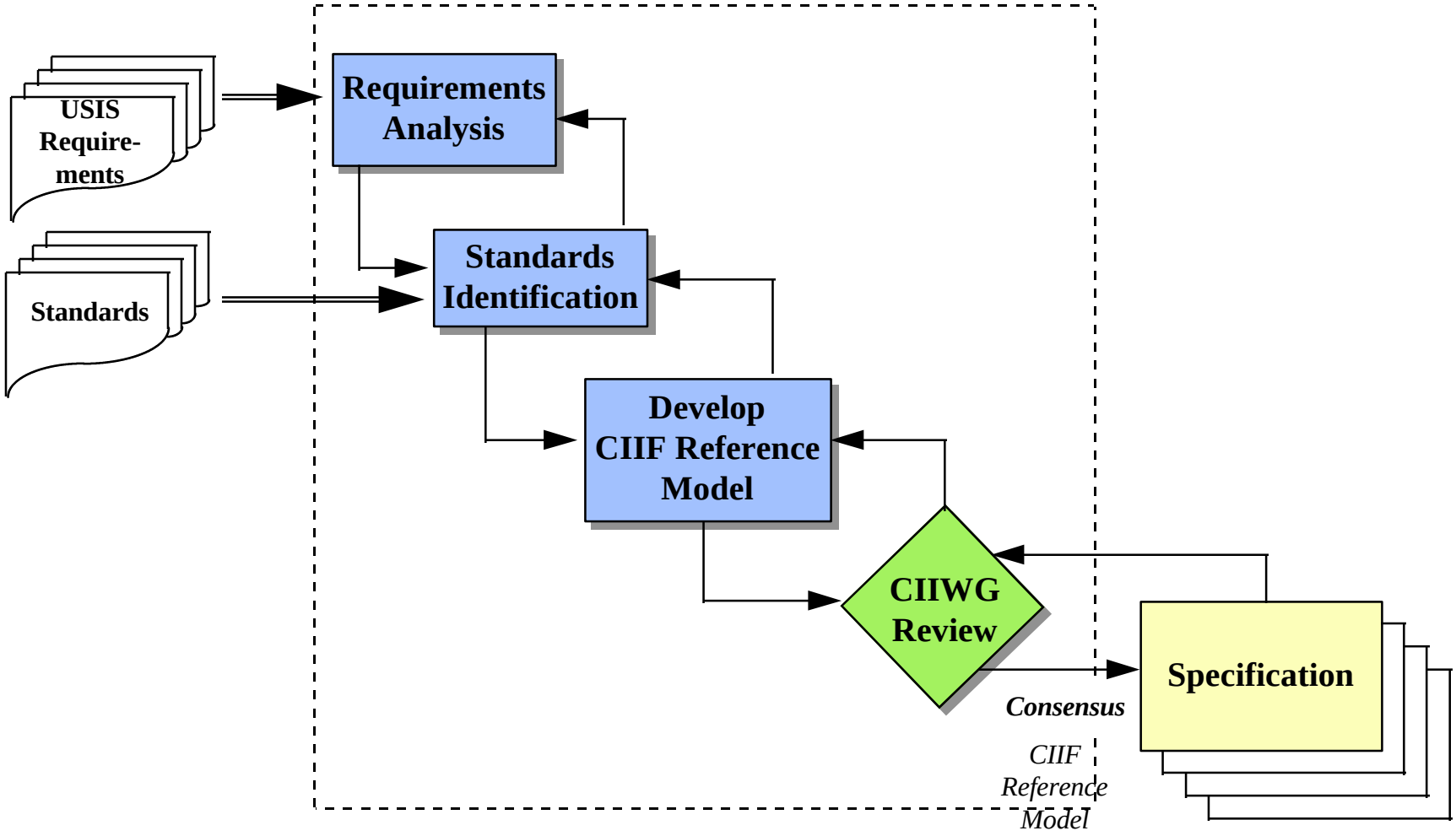
Common Imagery Interoperability Facilities Working Group Deliverables

- *CIIWG Management Plan*
- *CIIF Reference Model*
- Facility Specifications
- Facility Certification Plans
- Sample Implementations
- Test Results

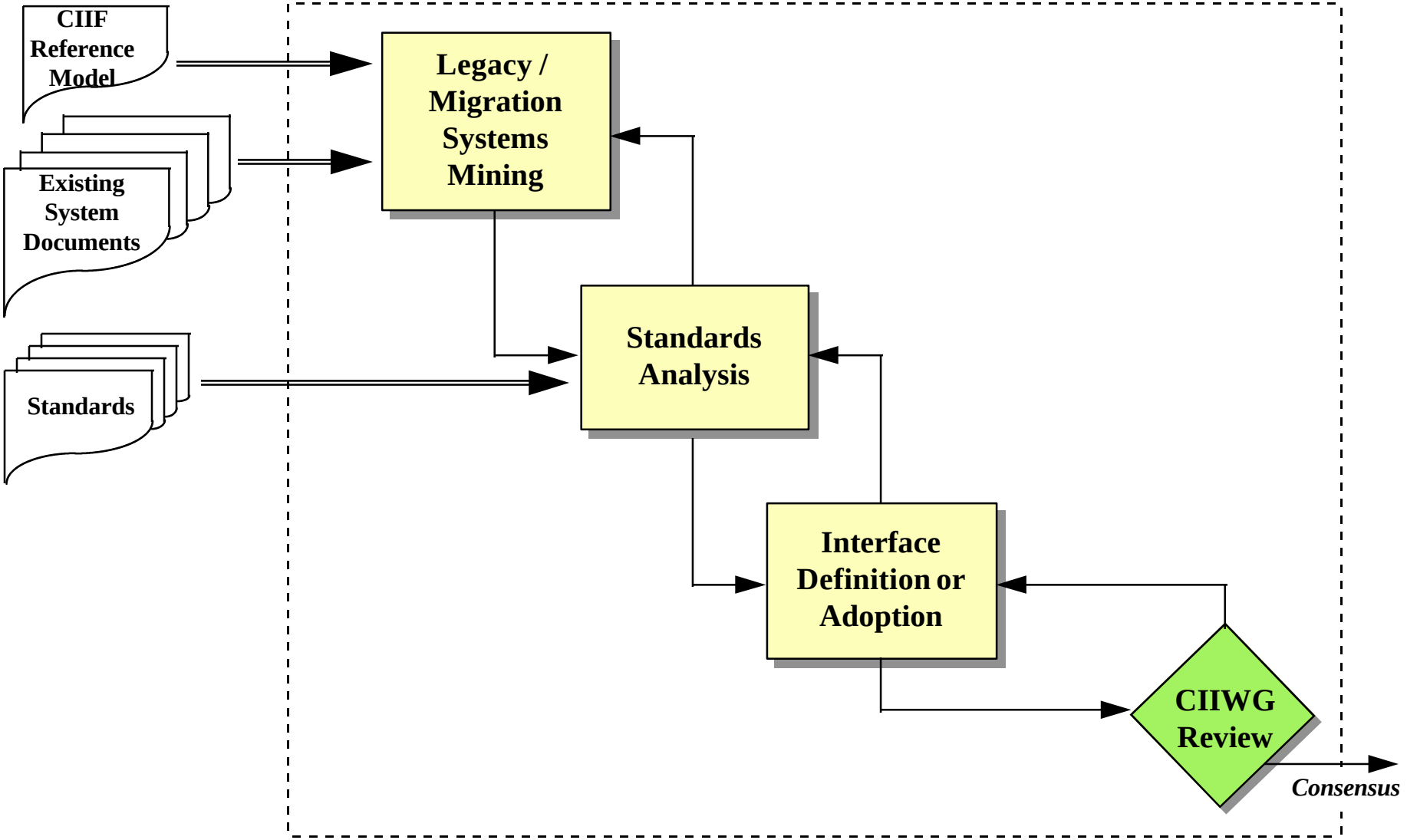
IT Standards Process Model
Adopted for CIIF Development
derived from JIEO PLAN 3200



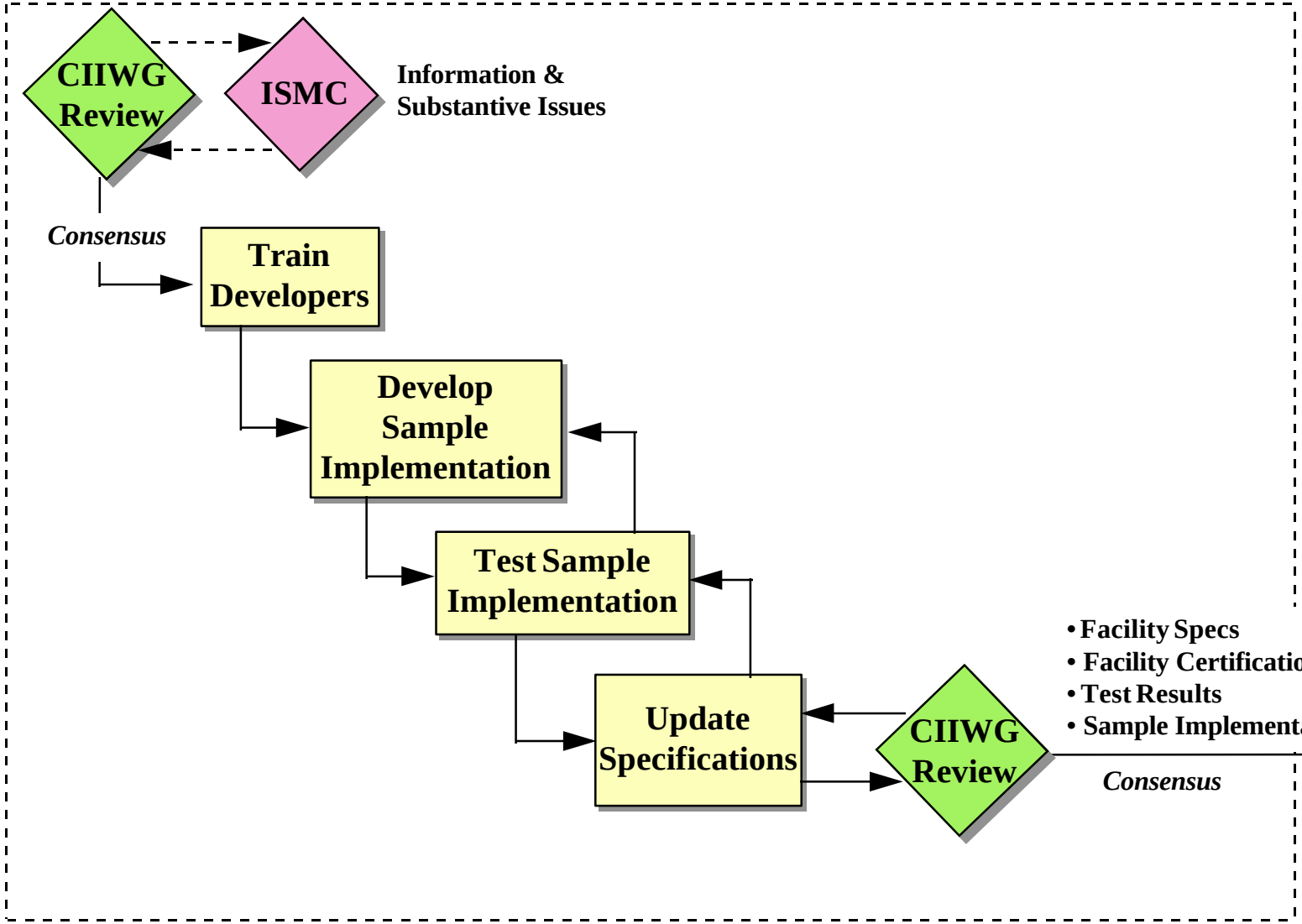
Requirements Analysis & Assessment



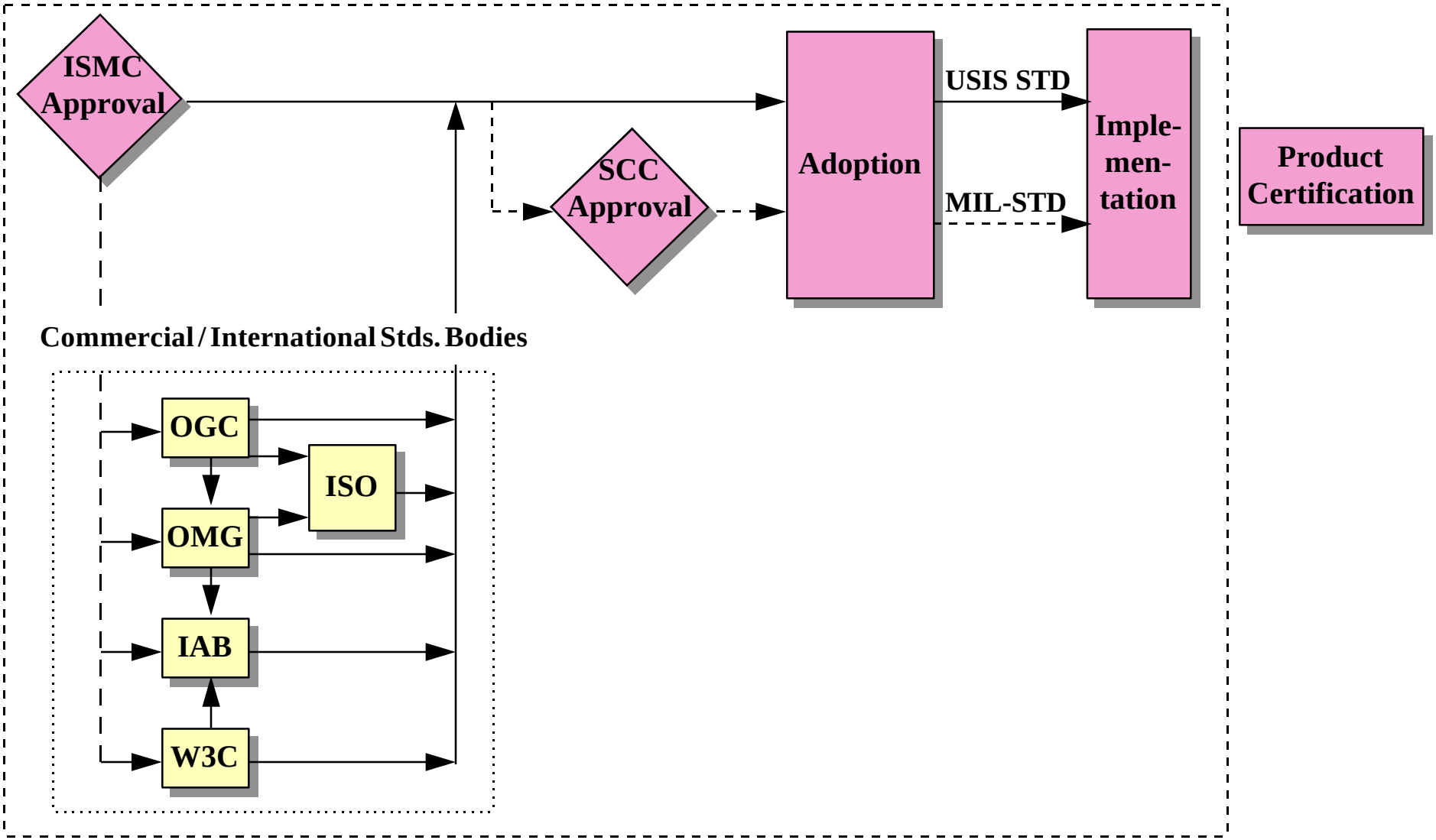
Specification



Specification
(Continued)



Adoption & Implementation



Organization Responsibilities

Organization / *Development Process*	CIO	CIIWG	Exec Agents	NEL	JITC	ISMC	SCC	Comm/ Int Stds Orgs
REQUIREMENTS ANALYSIS								
Requirements Analysis	P							
Standards Identification	P							
Develop CIIF Reference Model	P			C				
CIIWG Review		P				C		
SPECIFICATION								
Legacy / Migrations Systems Mining			P	C				
Standards Analysis			P	C				
Interface Definition or Adoption			P	C				
CIIWG Review		P				C		
Train Developers			P	C				
Develop Sample Implementation			P	C				
Test Sample Implementation			P	C	C			
Update Specifications			P	C				
CIIWG Review		P				C		
ADOPTION *	P					C	P	P
IMPLEMENTATION	P	C			C	C	C	
PRODUCT CERTIFICATION	C				P			

Executive Agent Assignments

Facility	IMINT	NPIC
Image Access	**X**	
Catalog Access	**X**	
Imagery Dissemination	**X**	
Profile & Notification	**X**	
Image Registration	**X**	
Image Mensuration		**X**
Geopositioning		**X**

Progress To Date

- Common Imagery Interoperability Working Group (CIIWG) established 25 Oct 95
- Draft *CIIF Reference Model* prepared Jan 96
- Draft *CIIWG Management Plan* prepared Jan 96
- Image Access Facility (IAF) defined, Sample Implementations developed and tested Nov 95
  - 100% Successful
- Published *IAF Interoperability Assessment Report* Jan 1996

Current Activities

- Finalize *CIIWG Management Plan* for ISMC approval
- Finalize *CIIF Reference Model* Version 1
- Find & Designate Executive Agents
- Update, retest, validate Image Access Facility
- Design, test, validate Catalog Access Facility
- Analyze MINT as possible source of Facilities
- Establish test, validation, certification capability at JITC
- Bi-monthly CIIWG meetings to coordinate the above

Current Activities
(Continued)

- Image Access Services Specification
  - Facilities
    - Image Access Facility: Retrieves selected imagery products, updates contents of an imagery library (by storing, deleting, or modifying imagery products)
    - Catalog Access Facility: Supports local and global imagery product discovery, product attribute (metadata) retrieval, product browsing, product cataloging and indexing
    - Image Dissemination Facility: Receives, prepares, prioritizes, transmits imagery products; supports product distribution management
    - Profile & Notification Facility: Supports registration & maintenance of standing interest profiles for imagery consumers, screens products against profiles, route products or product availability notifications
  - Executive Agent: IMINT
  - Schedule:
    - Preliminary IDL: May 1996
    - IDL / Sample Implementations Completed: October 1996

Current Activities
(Continued)

- Image Mensuration and Geopositioning Facilities
  - Image Mensuration Facility: Measures spatial characteristics of objects appearing within images
  - Geopositioning Facility: Supports derivation of precise geographic coordinates on images and maps
  - Executive Agent: NPIC
  - Schedule:
    - Preliminary IDL: December 1996
    - IDL / Sample Implementations Completed: TBD

Points of Contact

CIIWG Chair

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Email: ciiwg@itsi.disa.mil

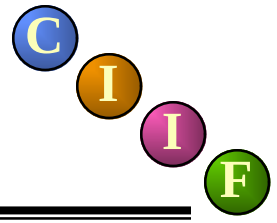
CIIWG Home Page: http://www.itsi.disa.mil/ismc/ciiwg/ciiwg.html

E-Mail Reflector: Subscribe to: nitf-request@linus.mitre.org

Include in Message Body: 'subscribe nitf' + *name*

E-mail Comments to: nitf@linus.mitre.org

Acronyms



ANSI - American National Standards Institute
API - Application Program Interface
ARD - Architecture Requirements Document
A3I - Accelerated Architecture Acquisition Initiative
CAF - Catalog Access Facility
CDL - Common Data Link
CDR - Critical Design Review
CIGSS - Common Imagery Ground / Surface System
CIIF - Common Imagery Interoperability Facilities
CIIWG - Commom Imagery Interoperability Working Group
CIL - Command Image Library
CIP - Common Image Processor
COM - Common Object Model (Microsoft)
CORBA - Common Object Request Broker Architecture
DDS - Defense Dissemination System
DII COE - Defense Information Infrastructure Common Operating Environment
DISA CFS - Defense Information Systems Agency Center for Standards
EEI - External Environment Interface
ESIOP - Environment Specific Inter-ORB Protocol
ESS - Exploitation Support System
FDDI - Fiber Distributed Data Interface
FTP - File Transfer Protocol
GIOP - Generic Inter-ORB Protocol
HTTP - Hyper Text Transfer Protocol
IAB - Internet Activities Board
IAF - Image Access Facility
IASS - Image Access Services Specification
ICD - Interface Control Document
IDL - Interface Definition Language
IESS - Imagery Exploitation Support System
IOC - Initial Operating Capability
IIOC - Interim Initial Operating Capability
IIOP - Internet Inter-ORB Protocol
IP - Internet Protocol
IPA - Image Product Archive
IPL - Image Product Library
ISB - Information Systems Board
ISDN - Integrated Services Digital Network
ISMC - Imagery Standards Management Committee
ISO - International Standards Organization
JCMT - Joint Collection Management Tools
JITC - Joint Interoperability Test Command
JRD - Joint Requirements Document
NES - National Imagery & Mapping Agency Exploitation System
NIL - National Image Library
NTB - NITFS Technical Board
MIDB - Modernized Intelligence Database
MINT - Multi-source Intelligence Tools
NITFS - National Imagery Transfer Format Standards
NPIC - National Photographic Interpretation Center
OGC - Open Geodata Interoperatbility Specification ™ (GIS) Consortium
OLE - Object Linking & Embedding (Microsoft)
OMA - Object Management Architecture (OMG)
OMG - Object Management Group
OSI - Open Systems Interconnect
PDR - Preliminary Design Review
PIKS - Programmer's Imaging Kernel System
PPP - Point-to-Point Protocol
RFP - Request for Proposal
RPC - Remote Procedure Call
SCC - Standards Coordination Committee
SMTP - Simple Mail Transfer Protocol
SPIA - Standards Profile for Image Access
SRR - System Requirements Review
TAFIM - Technical Architectural Framework for Information Management
TCP - Transmission Control Protocol
UDP - User Datagram Protocol
USIS - United States Imagery System
USIS S&G - USIS Standards & Guidelines
VWG - Video Working Group
W3C - World Wide Web Consortium